



C A T A L O G U E

## Company Profile

TOPCAST is a company specialised in casting machines design and manufacturing. Competence developed in the investment casting field, thermal processes, induction heating and power electronics set it as an ideal partner also for custom applications. A group of qualified engineers and designers, constantly updated and oriented to the research of enhanced technological solutions, grants a product range definitely at the state of the art.

Product versatility to meet different production needs, quality design, post-sales assistance and technical help to satisfy particular needs make TOPCAST the best company to count on in a global competition scenery.

Areas of application are:

- Casting
- Melting
- Heat treatment
- Welding
- Brazing

Our technical office is available to evaluate any customer inquiry. Please contact us for a personal quotation if you have any induction heating need. .

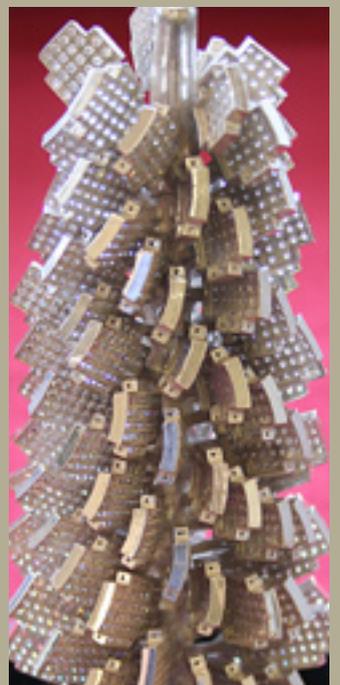


Applications		TVCd	TVCs	TCE-B	TCE-A	TMF	TGEN	TCF	TSF-B
Jewellery Field	Gold & Silver casting	●	●						
	Platinum, Palladium and Steel casting			●					
	Melting					●	●		
	Precious Metals Assay							●	
	Titanium casting			●	●				
Medical and Dental Field	Precious Alloy and CrCo casting			●					
	Titanium casting			●	●				
	Zirconia Sintering								●
Industrial Field	Lost-wax casting of Al, Bronze & Brass	●	●						
	Lost-wax casting of Steel			●					
	Melting					●	●		
	Steel and Iron assay					●			
	Hardening, Soldering and Brazing						●		
	Titanium casting			●	●				
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Alloys and Machines		TVCd	TVCs	TCE-B	TCE-A	TMF
Ag	Silver	●	●	○	○	●
Al	Aluminium	●	●	○	○	●
Au	Gold	●	●	○	○	●
	Brass	●	●	○	○	●
	Bronze	●	●	○	○	●
Cu	Copper	●	●	○	○	●
Mg	Magnesium	●			●	
Pd	Palladium			●	○	●
Pt	Platinum			●	○	●
	Steel			●	○	●
	Super alloys				●	●
Ti	Titanio				●	
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● Suggested - ○ Possible



## Description

TVCd is the pressure over vacuum casting machine designed to meet the more severe needs in lost wax casting production.

This machine works with a new, revolutionary double chamber concept. This innovative system gives you several advantages compared with the traditional single chamber suction system used by all our competitors.

With TVCd you can use a simple and plain steel pipe flask instead of the perforated flask, which is safer (metal cannot spill out), cheaper

and easy to fill with the investment slurry (no tape needed around the flask).

Size of the flask can reach up to 400mm in height instead of the max 250 mm normally used while working with conventional casting machines.

This will save more than 200g of gold per flask and will save more than 40% in consumables as graphite and inert gas consumption.

The casting cycle takes only 3 minutes and, while the previous

flask is cooling down in protective gas for no oxidation, the next charge can be loaded into the machine and melted, thus overlapping two cycles for no time waste.

The machine is fully automatic having more than 100 programs suitable for every kind of alloy.

This amazing machine is the synthesis of the most advanced engineering and years of experience in casting that only TOPCAST can bring to your factory.



## TECHNOLOGY & FEATURES

### Gas Wash Procedure

- Crucible loading operation introduces oxygen
- The Gas Wash Purge procedure removes the oxygen (1) in a very fast and efficient way and then refills back the chambers with Argon or Helium gas (2)
- Compared with the traditional crucible protection with flow-meter regulation the consumption of gas is dramatically reduced and the alloys oxidation is minimized
- Moreover the crucible life is increased: TVC series crucible last up to 250 – 400 casting cycles according to the graphite quality

### Melting

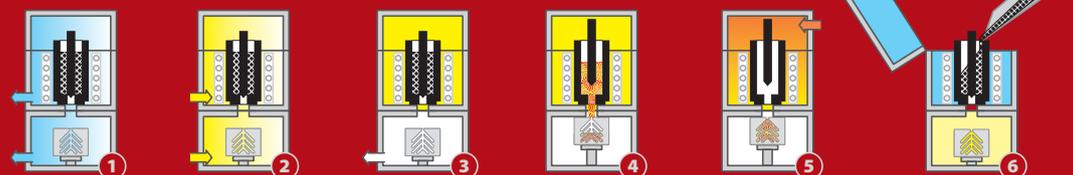
- Advanced Self Tuning thermoregulation (AST™) with exact temperature control of the melted alloys
- TwoSet-Points available: Homogenization and Casting Temperature
- Medium frequency induction heating stirs the melted alloy and leads to a perfect homogeneity
- Pulse Stirring Management (PSM™) for an extremely low frequency stirring
- Highest power density in the market features strongest stirring and low gold losses

### Injection and Compression

- When the stopper lifts up, it is very important to control the injection rate to avoid turbulences
- TVC has the unique feature to have the injection rate controllable and programmable (IRC™)
- The metal enters smoothly inside the mould (4). Then, after filling and during the solidification phase, a strong compression takes place on the tree (5)
- No turbulences in filling and high compression rate lead to a large reduction of shrinkage porosity phenomena

### Tree protection after casting

- Thanks to the double chamber concept, after the solidification phase, the flask cools down in a protective atmosphere while at the same time you can load your alloy in the melting chamber for the next melting.
- This operation will allow an overlapping of the casting cycles which will give you the ability to protect longer the tree before removing it without losing time and productivity



# Double Chamber TVCd

## Pressure Over Vacuum Casting Machine



	TVC5d	TVC10d	TVC12d	TVC12d-Mg	TVC25d	TVC35d	TVC45d
Application	Small labs and research departments	Medium laboratories	Large laboratories	Magnesium alloys	Small Foundries	Medium Foundries	Large Foundries
Number of casting programs	100	100	100	100	100	100	100
Working Capacity of graphite crucible	1 kg Au 0,5 kg Ag	3 kg Au 1,5 kg Ag	5 kg Au 2,5 kg Ag	500g Mg (AZ91)	5 kg Al 9 kg Bronze	10 kg Al 20 kg Bronze	30 kg Al 80 kg Bronze
Flask maximum diameter (mm)	Ø150	Ø150	Ø150	Ø150	Ø300	Ø350	Ø600
Flask maximum height (mm)	300 / 400	300 / 400	300 / 400	300 / 400	600	600	800
Induction power	5 kW	10 kW	12 kW	12 kW	25kW	35kW	45kW
Vacuum pump	Built-in 25 m <sup>3</sup> /h	Built-in 25 m <sup>3</sup> /h	Built-in 25 m <sup>3</sup> /h	Built-in 25 m <sup>3</sup> /h	External	External	External
Pressure over vacuum	3 bar	3 bar	3 bar	3 bar	1 bar	1 bar	1 bar
Max. temperature	1600 °C	1600 °C	1600 °C	1600 °C	1400°C	1400°C	1400°C
Shot maker	○	○	○	○	○	○	○
Autotest with data report	●	●	●	●	●	●	●
Monitoring system for process and production data collection	○	○	○	○	○	○	○
Flask check before casting	●	●	●	●	●	●	●
Vacuum leakage detector	●	●	●	●	●	●	●
Oxygen Analyzer	○	○	○	○	○	○	○
RS232 remote interface	○	○	○	○	○	○	○
Main alloys	Gold (Au), Silver (Ag), Copper (Cu), Brass, Bronze, Aluminium (Al) and their alloys						

● Provided - ○ Available on request

## Description

TVCs is a fully automatic, robust, easy to use pressure over vacuum casting machine designed for small and medium casting laboratories.

This machine works with the well known pressure over vacuum concept, thus preferring the perforated flask against the solid ones.

Alloy melting is achieved in protective atmosphere (Nitrogen, Argon or Helium) while a strong vacuum pump is provided in order to boost the suction effect into the mould.

Moreover as soon as the metal has entered the mould a strong compression takes place on top of the tree to reduce shrinkage porosity.

Flask size can reach up to 300mm in height and 160mm in diameter.

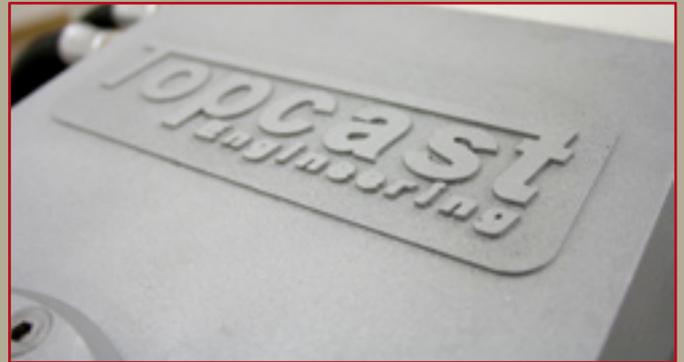
Crucible graphite consumption is greatly reduced thanks to the gas-wash procedure which remove the oxygen in few seconds from the charge loading operation.

The machine is fully automatic making the operator's job very

easy (you simply have to load the alloy and flask and then press the START button). This will give you the most consistent result flask to flask.

And remember, meanwhile the machine is running the cycle, you can do other important jobs in your factory.

Having a consistent, robust and easy to use machine in your factory is the key factor for a reliable casting production.



## TECHNOLOGY & FEATURES

### Gas Wash Procedure

- Crucible loading operation introduces oxygen
- The Gas Wash Purge procedure removes the oxygen (1) in a very fast and efficient way and then refills back the chambers with Argon or Helium gas (2)
- Compared with the traditional crucible protection with flow-meter regulation the consumption of gas is dramatically reduced and the alloys oxidation is minimized
- Moreover the crucible life is increased: TVC series crucible last up to 250 – 400 casting cycles according to the graphite quality

### Melting

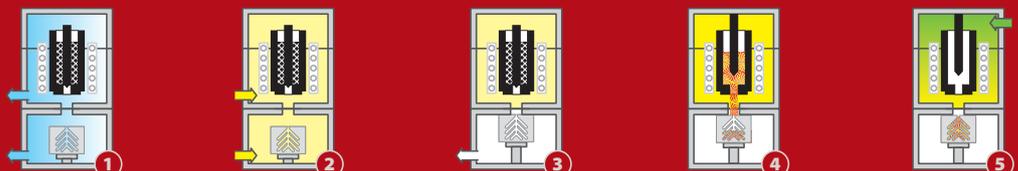
- Advanced Self Tuning thermoregulation (AST™) with exact temperature control of the melted alloys
- Medium frequency induction heating stirs the melted alloy and leads to a perfect homogeneity
- Pulse Stirring Management (PSM™) for an extremely low frequency stirring

### Injection and Compression

- When the stopper opens, as soon as the molten metal fills the flask, a trigger is launched to the over pressure valve which will make the gas flow enter smoothly and quickly to compress the tree during the solidification phase to reduce shrinkage porosity

### Tree protection after casting

- After the solidification phase, the flask cools down in a protective atmosphere to avoid oxidation.
- A blinking lamp will signal the operator that the cycle has ended and the flask can be removed



# Single Chamber TVCs

## Pressure Over Vacuum Casting Machine



	TVC3s	TVC4s	TVC10s	TVC10s-A
Application	Small labs	Entry level model	Mdium laboratories	Brass Foundries
Number of casting programs	1	1	8	8
Working Capacity of graphite crucible	1 kg Au 0,5 kg Ag	2 kg Au 1 kg Ag	3 kg Au 1,5 kg Ag	2.5 kg Brass
Flask maximum diameter (mm)	Ø150	Ø150	Ø150	Ø150
Flask maximum height (mm)	280	280	280	280
Induction power	3 kW	4 kW	10 kW	10kW
Vacuum pump	External	External	External	External
Pressure over vacuum	2 bar	2 bar	3 bar	3 bar
Max. temperature	1400 °C	1400 °C	1400 °C	1400°C
Shot maker	○	○	○	○
Autotest	●	●	●	●
Monitoring system for process and production data collection	○	○	○	○
Flask check before casting	●	●	●	●
Vacuum leakage detector	●	●	●	●
Oxygen Analyzer	○	○	○	○
RS232 remote interface	○	○	○	○
Main alloys	Gold (Au), Silver (Ag), Copper (Cu), Brass, Bronze, Aluminium (Al) and their alloys			

● Provided - ○ Available on request

## Description

TCE is a consistent, robust and easy to use vacuum centrifugal casting machine designed for small and medium casting laboratories.

TCE in Class B is particularly suited for Platinum, Palladium and Steel while TCE in Class A has been especially designed for Ti casting.

The casting process is fully programmable and consists of the following phases:

- Gas washing to remove oxygen from the melting chamber
- Alloy Melting in Vacuum or protective atmosphere
- Induction melting and stirring of the alloy to get perfect homogenization
- Accurate control of the temperature with a proprietary narrow band optical pyrometer
- Vacuuming of the chamber before casting
- Centrifugal casting with speed and acceleration digitally controllable
- Cooling in inert atmosphere before removing the flask

Casting is not only machines. For this reason TOPCAST invests in a deep and continuous research on crucible and investment materials to give to our customers always the state of the art casting solution for any alloy.



## Class A and Class B

The main difference between TCE in Class A and TCE in Class B is the degree of vacuum, leak-back rate and ppm control of oxygen in the process chamber, that makes the TCE in Class A the best solution for casting reactive metals like Titanium.

Also the choice of the vacuum pumps station and the induction power generator is different and chosen to get the maximum result in Ti cast parts.

Hence, TCE machines conceived in Class A are suitable for fields that require high quality control and low interstitial pick-up on the Ti cast parts, like Aerospace, Medical and Automotive.

TCE10 in Class B can instead be used where the price of the machines is an important factor and where no high quality control of the metallurgy of the Ti cast part is required, like in Jewellery, Eye-Glass and Leisure Industry (Golf Clubs, etc ...).

Regarding the mold size and crucible capacity, today with TCE you can cast up to 1.7 kg Ti and use flasks up to 140mm in diameter and 380mm in length.

We are also developing larger machines under customized specifications for what concerns Ti crucible capacity and Flask mould size. In case you are interested in getting a quotation for non-standard casting machine do not hesitate to send us your technical specifications.

TOPCAST also supplies special crucibles and investment powder for Titanium casting particularly designed to avoid alpha-case structure in the cast parts.

Crucibles for Ti have been designed to avoid alloy contamination and to withstand the high chemical and thermal shocks involved in Ti melting



## TECHNOLOGY & FEATURES

### Gas Wash Procedure

- Crucible and mould loading operation introduces oxygen
- The Gas Wash Purge procedure removes the oxygen (1) in a very fast and efficient way and then refills back the chambers with Argon, Nitrogen or Helium gas (2)

### Class A

- Level of vacuum reached is extremely high
- Leak-back rate is carefully minimized
- Oxygen ppm in final atmosphere can be precisely controlled

### Melting

- Advanced Self Tuning thermoregulation (AST™) with exact temperature control of the molten alloys
- Accurate control of the temperature with a proprietary narrow band optical pyrometer
- Medium frequency induction heating stirs the melted alloy and leads to a perfect homogeneity
- Magnetic field frequency has been studied for best coupling and energy transfer

### Injection and Compression

When the charge is molten, the coil is retracted and the arm starts to spin.

During the spinning the metal gets out from the crucible and enters the flask.

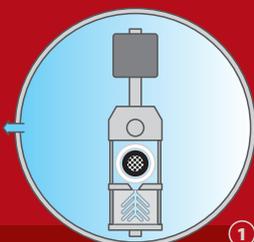
Rotational speed profile, which controls the injection rate, can be regulated digitally for a consistent and reliable mould filling.

The final speed will compress the tree during the solidification phase to reduce shrinkage porosity.

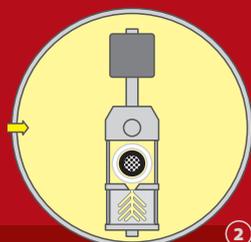
### Tree protection after casting

After the solidification phase, the flask cools down in a protective atmosphere to avoid oxidation.

A blinking lamp will signal the operator that the cycle has ended and the flask can be removed



1



2



3



4

## Vacuum Centrifugal Casting Machine



	TCE Class B			TCE Class A		
	TCE5	TCE10	TCE50	TCE8-Ti	TCE12-Ti	TCE50-Ti
Application	Small labs	Medium labs	Large labs	Small labs	Medium labs	Large labs
Working Capacity	500g Pt 250g Steel	1500g Pt 1000g Steel	8 kg Steel	100g Ti	350g Ti	1700g Ti
Flask maximum diameter (mm)	Ø110	Ø130	Ø140	Ø110	Ø130	Ø140
Flask maximum height (mm)	120	180	380	120	180	380
Induction power	8 kW	10 kW	50 kW	8 kW	10 kW	50 kW
Speed	500 rpm	350 rpm	300 rpm	500 rpm	350 rpm	300 rpm
Vacuum pump	External	External	External	External <sup>1</sup>	External <sup>1</sup>	External <sup>1</sup>
Max. temperature	2000 °C	2000 °C	2000 °C	2000 °C	2000 °C	2000 °C
Monitoring system for process and production data collection	○	○	●	○	○	●
Vacuum leakage detector	●	●	●	●	●	●
Oxygen Analyzer	○	○	●	○	○	●
RS232 remote interface	○	○	●	○	○	●

● Provided - ○ Available on request

<sup>1</sup> Vacuum performance, leak rate and oxygen content are sensitive data and cannot be disclosed in this catalogue. Please contact TOPCAST for more information.

# TGEN

## Induction Frequency Converters

TOPCAST designs state of the art generators for induction heating application.

The design approach uses both configurations: parallel and series resonant topology adopting the latest and most advanced IGBTs and SCRs modules available worldwide.

In our generators, galvanic insulation between coil and power mains gives the maximum safety for the user, while digital technology makes our furnaces soundless, versatile and reliable.

Fibre optics connections give to our electronics the highest immunity to electrical noise also in harsh environment.

An accurate study of the coil guarantees a very high heating efficiency while medium frequency magnetic field stirs the molten metal and leads to high homogeneity of the alloys

Temperature control can be chosen between IR optical pyrometer and thermocouple while the electronic board implements an advanced self-tuning thermoregulation algorithm with exact temperature control.

Melting plants can be provided with one or more melting stations using a power switch to drive one station or the other.



	TGEN5	TGEN15	TGEN50	TGEN100	TGEN150	TGEN200
Induction power	5 kW	15 kW	50 kW	100 kW	150 kW	200 kW
Frequency range	5 – 50 kHz	5 – 50 kHz	5 – 50 kHz	5 – 25 kHz	5 – 25 kHz	5 – 25 kHz
MF voltage	550 V					
Monitoring system for process and production data collection	○	○	○	○	○	○
Remote control	○	○	○	○	○	○

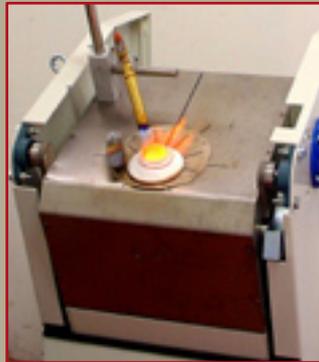
● Provided - ○ Available on request

Maintenance of the furnace is very easy and allows rapid changing of the crucible and the safety refractory shell.

Inert gas or gas-flame are foreseen to protect the melt from oxidation.

Touch screen display is provided for a fast and user-friendly interface.

A water cooling plant is needed to cool the induction heating coils and the power generator.



	TMF5	TMF7	TMF10	TMF12	TMF-10P
Graphite crucible	6 kg Au	8,5 kg Au	13,5 kg Au	17 kg Au	1 kg Steel (for steel assay purpose)
SiC crucible	4 kg Au	12 kg Au	12 kg Au	12 kg Au	
Power	5 kW	7 kW	10 kW	12 kW	10 kW
Max. temperature	1300 °C	1350 °C	1400 °C	1450 °C	1800 °C
Melting time	15 min.	15 min.	15 min.	20 min.	3 min.

	TMF10-R	TMF15-R	TMF25-R	TMF35-R	TMF45-R	TMF60-R	TMF100-R	TMF150-R	TMF200-R
Power	10 kW	15 kW	25 kW	35 kW	45 kW	60 kW	100 kW	150 kW	200 kW
Zirconia crucible	1 kg Pt	2 kg Pt	8 kg Pt	12 kg Pt	22 kg Pt	30 kg Pt	40 kg Pt	80 kg steel	120 kg steel
Max. temperature	2000 °C	2000 °C	2000 °C	2000 °C					
Alumina crucible	2 kg steel	5 kg steel	10 kg steel	15 kg steel	25 kg steel	50 kg steel	60 kg steel	80 kg steel	120 kg steel
Max. temperature	1700 °C	1700 °C	1700 °C	1700 °C					
SiC crucible	20 kg Au 10 kg Ag	20 kg Au 10 kg Ag	40 kg Au 25 kg Ag	40 kg Au 25 kg Ag	40 kg Au 25 kg Ag	100 kg Au 50 kg Ag	200 kg Au 100 kg Ag	500 kg Au 300 kg Ag	800 kg Au 500 kg Ag
Max. temperature	1450 °C	1350 °C	1350 °C	1350 °C	1350 °C				

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